REMARKS

Claims 2, 4-8, 12-14 and 17-31 remain pending in the application. Claims 1 and 9-11 (previously withdrawn) have now been canceled without prejudice or disclaimer. It is proposed to amend claim 8 without introduction of new matter. Entry of these amendments and favorable reconsideration are respectfully requested in view of the above amendments and the following remarks.

The indication that claim 8 defines patentable subject matter is noted with appreciation. Accordingly, it is now proposed to rewrite claim 8 in independent form, including all of the limitations of the base claim and any intervening claims. Entry of this amendment is respectfully requested because this amendment will put claim 8 into condition for allowance.

The courtesy extended by the Examiner to Applicant's representative in a personal interview conducted on May 31, 2006 is noted with appreciation. During the interview, the parties discussed Applicant's answers to a number of questions posed in the Final Office Action. The Examiner suggested that an After-Final Response, putting those answers in writing, would be helpful to advancing the prosecution of this application. Hence, this After-Final Response is now being submitted.

Claims 2, 4, 12, 17, and 19 again stand rejected under 35 U.S.C. §112, second paragraph, as allegedly being indefinite. This rejection is respectfully traversed.

The Office notes that claim 2, line 3, recites "at least one code is never used for transmitting signals", and objects that "if the code is never used, how can the receiver 'estimate said interference... using said... code'". In response, it is pointed out that claim 2 does *not* state that the code is never used. What claim 2 defines is that "said at least one code is never used *for transmitting signals*." (Emphasis added.) Claim 2 then further defines "receiving a composite signal; and *estimating* said interference *at a receiver* using said at least one reserved code." Applicant can find no contradiction in specifying that a code is not to be used for transmitting, but that it may be used as part of a receiving process (i.e., for purposes of interference estimation). Accordingly, no amendment to claim 2 is believed to be necessary.

As explained at the personal interview mentioned above, a purpose of the various claimed embodiments is to estimate interference using the reserved code, not to receive

information using the reserved code. The following explanation may help the Office to better understand the operation of the invention.

As is well known, and as discussed in the application at page 1, line 25 through page 2, line 16, CDMA systems allow interfering signals to share the same frequency at the same time. More specifically, CDMA systems "spread" signals across a common communication channel by multiplying each signal with a unique spreading code sequence. The signals are then scrambled and transmitted on the common channel in overlapping fashion as a composite signal. Each mobile receiver correlates the composite signal with a respective unique despreading code sequence to thereby extract the signal addressed to it. The signals which are not addressed to a mobile receiver in CDMA assume the role of interference.

As further explained in the application at page 5, lines 5-17, in a system employing wideband code division multiple access (WCDMA), channels are commonly transmitted from one base station using orthogonal channelization codes and the same scrambling codes; therefore, in making a SIR (signal to interference ratio) determination in such a WCDMA system one should not only consider the interference from the base station which is orthogonal to the wanted signal, but also the interference from other base stations which is non-orthogonal to the wanted signal. When a signal is despread and combined at a mobile station, one skilled in the art will appreciate that the interference that is orthogonal to the wanted signal does not corrupt the signal. However, this cannot be said of the interference that is non-orthogonal to the wanted signal. Therefore, it is important to consider this non-orthogonal interference in estimating the mobile station's SIR.

The Background section of the application discusses a number of known methods for determining interference, including a "third method" discussed on page 6, lines 16-24. This third method involves correlating the received signal with the channelization code allocated to the connection during a time *when nothing is being transmitted to the mobile station.* Since there is no "wanted" signal, despreading the received signal would then yield a good estimate of the interference. However, as noted in the application, a problem with this approach is that the mobile station has to know when no information is being transmitted to it. This could be solved by having predetermined time-instants of no transmission, but such a solution has a certain capacity loss, since the interference measurement would need to be updated quite regularly.

Applicant's invention addresses these problems. As explained in the application at, for example, page 12, line 21 through page 13, line 10, the mobile station receives an analog signal which includes both the signal intended for the mobile station and interference. The power of the received signal (RS) includes the power of the received wanted signal (S) and the power of any existing interference from the same base station that is orthogonal to the wanted signal (I_{ORTH}). In addition, the power of the received signal includes the power of any noise and interference from other base stations that are non-orthogonal to the wanted signal ($I_{NONORTH}$). The following equation illustrates this relationship:

$$RS = S + I_{ORTH} + I_{NONORTH}. \quad (1)$$

In the RAKE receiver 330, the digital signal is despread by multiplying the signal with the unique orthogonal code word associated with the particular mobile station, e.g., a code selected from the code tree of the application's Figure 4 to provide a desired data rate while maintaining orthogonality. *As a result, the amplitude of the wanted signal increases and the orthogonal part of the interference disappears. The power of the rest of the interference (i.e., that interference which is non-orthogonal) is not changed.*

Thus we come to the aspect of the invention that enables this interference to be measured. As explained in the application at, for example, page 13, line 19 through page 14, line 3, "the RAKE receiver of Figure 7 can also be used to generate an estimate of the interference associated with the received signal by despreading the received signal with a *reserved interference measurement code*. *Since the reserved interference measurement code is never (or at least not typically) transmitted in the forward link, by correlating the received forward link signal with the reserved code, the result would be an estimate of the interference including intra-cell interference, inter-cell interference and thermal noise.* If this correlation is performed for each selected path in the de-spreading process, a good estimate of the interference per path is obtained." (Emphasis added.)

In view of the above discussion, the answers to such questions as "If the code is not used by the transmitter, why would a receiver use that code?" should be readily apparent: to measure interference. Put another way, if the receiver were to use a code that was not reserved (i.e., some transmitter within "hearing distance" of the receiver is using that code to generate signals for transmission), then the receiver would end up demodulating information

intended for another receiver. This would not be a good measure of interference. It is only by having confidence that the code is never (or not typically) used for transmission that the receiver can use the reserved code in what would otherwise be a demodulation process to generate a reliable measure of interference.

The Office further objects that "'signals' should be further defined." Applicant respectfully disagrees. In the interest of expediting favorable prosecution, Applicant previously amended the preamble of claim 2 to define "a method for estimating interference in a radio communication system" to even more clearly define the context in which the word "signals" is used. In this context, "signals" is a well-known term of art that does not require further definition. See, for example, the very art cited and applied by the Office in the Action: Wichman et al. (US 6,665,334) uses the word "signal" in a similar manner, such as 3, lines 14-16 where it is stated, "When sending the *signals*, the base station has multiplied a *signal* intended for each terminal by a spreading code used in the connection concerned." (Emphasis added.) Accordingly, no amendment is believed to be necessary to address the Office's concern.

In view of the foregoing, it is believed that the claims define the invention with sufficient particularity and distinctness to satisfy the requirements of the statute. It is therefore respectfully requested that the rejection of claims 2, 4, 12, 17, and 19 under the second paragraph of 35 U.S.C. §112 be withdrawn.

Claims 2, 4-7, 12-14, 17-24, and 27-29 again stand rejected under 35 U.S.C. § 102(e) as allegedly being anticipated by Wichman et al. (U.S. Patent No. 6,665,334). This rejection is respectfully traversed.

As more fully explained above, the various embodiments defined by these claims all relate to interference estimation in a Code Division Multiple Access (CDMA) communication system. In such a system, interfering signals are allowed to share the same frequency at the same time. This is achieved by, on the transmitter side, multiplying each signal with a unique spreading code sequence. The signals are then scrambled and transmitted on the common channel in overlapping fashion as a composite signal. Each mobile receiver correlates the composite signal with a respective unique despreading code sequence to thereby extract the signal addressed to it. See, for example, pages 1-2 in Applicant's specification.

One characteristic of such a system is that signals that are not addressed to a mobile receiver assume the role of interference. To achieve reliable reception of a signal, the ratio of the signal to the interference should be above a prescribed threshold for each mobile station (referred to as a required signal-to-interference ratio, or SIR_{req}). Being able to accurately measure the level of interference that occurs concurrently with the desired signal is, therefore, very important in CDMA systems because that measurement forms the basis for any of a number of different power control mechanisms that are employed to make sure that each signal contributing to the composite signal is transmitted at neither too strong nor too weak a power level.

The Background section of Applicant's disclosure describes a number of known techniques for measuring the interference, which variously involve the receiver's use of a spreading code that can also be used by a transmitter. One of these is the "third method" mentioned above and described in the application on page 6, lines 16-24.

Applicant's methods and apparatuses for estimating interference take an entirely different approach. In embodiments defined by independent claim 2, a method for estimating interference comprises the steps of "*reserving at least one code in a set of codes for interference measurement only such that said at least one code is never used for transmitting signals*; receiving a composite signal; and *estimating said interference at a receiver using said at least one reserved code*." (Emphasis added.) In the course of the personal interview referenced above, the Examiner wondered whether a code that is reserved for, say, a particular time slot would satisfy claim 2's recitation of "never." The answer is no: reserving for a time slot (or other fixed period of time) only ensures that the code will not be used at particular times. Such a solution would seem comparable to the "third method" discussed in the application, and would suffer from at least the drawbacks mentioned in the specification, namely, the problem of how to inform the mobile when an interference measurement can be made, and if this is solved by having predetermined time-instants, then the corresponding capacity loss that goes with it, since the interference measurement would need to be updated quite regularly.

Each of independent claims 5, 21, 22, and 27 similarly defines reserving a code that is used only or primarily for estimating interference associated with a received signal.

It is well known that "[a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art

reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). In the present instance, independent claims 2, 5, 21, 22, and 27 are not anticipated by Wichman et al. at least because Wichman et al. fail to disclose or even suggest reserving at least one code in a set of codes only (or primarily) for interference measurement, and then using that reserved code to estimate interference in the composite signal.

Wichman et al. does not appear to be concerned with estimating interference. Instead, the Wichman et al. patent describes techniques for *cancelling* the effect of interfering signals from a desired signal. (See, e.g., the Abstract of Wichman et al.) In order to do this, the receiver first estimates the number of signals and the codes that are used. (See, e.g., Wichman et al. at column 3, lines 47-54.) Once the codes associated with interfering signals are identified, the interfering signals are detected and removed from the received signal by means of known methods of interference cancellation. (See, e.g., Wichman et al. at column 5, lines 29-31.)

Thus, the Wichman et al. patent fails to anticipate Applicant's claims at least because it neither discloses nor suggests "reserving at least one code in a set of codes for interference measurement only *such that said at least one code is never used for transmitting signals*; receiving a composite signal; and *estimating said interference at a receiver using said at least one reserved code*." To the contrary, Wichman et al.'s technique relies only on codes that *are* used for transmitting signals. (See, e.g., Wichman et al. at column 3, lines 35-37.)

In support of its rejection, the Office argues that, regarding claim 2, "figure 3 discloses a receiver for receiving a composite signal comprising a desired signal and plurality of interfering signals each associated with a predetermined code (reserving at least one code)..." The Office's very argument, then, confirms that Wichman et al. disclose predetermined codes being reserved *for use by the interfering signals.* This is directly counter to Applicant's claimed subject matter, which defines the reserved code as being one that, for example, "is never used for transmitting signals." If the code is never used for transmitting signals, it could not be reserved for use by the interfering signals as required by Wichman et al.

For at least the foregoing reasons, independent claims 2, 5, 21, 22, and 27, as well as the dependent claims 4, 6-7, 12-14, 17- 20, 23-24, and 28-29 are believed to be patentably

distinguishable over the Wichman et al. patent. Accordingly, it is respectfully requested that the rejection of claims 2, 4-7, 12-14, 17-24, and 27-29 under Section 102(e) be withdrawn.

Claims 25, 26, 30, and 31 stand rejected under 35 USC §103(a) as allegedly being unpatentable over Wichman et al. This rejection is respectfully traversed.

Claims 25, 26, 30, and 31 variously depend from independent claims 22 and 27, and are therefore patentably distinguishable over the Wichman et al. patent for at least the same reasons as those set forth above. It is therefore respectfully requested that the rejection of claims 25, 26, 30, and 31 under Section 103(a) be withdrawn.

The application is believed to be in condition for allowance. Prompt notice of same is respectfully requested. If the Examiner believes that further discussion would help to advance favorable prosecution of the application, he is invited to call the undersigned attorney at 703-718-8884.

Respectfully submitted,

Potomac Patent Group PLLC

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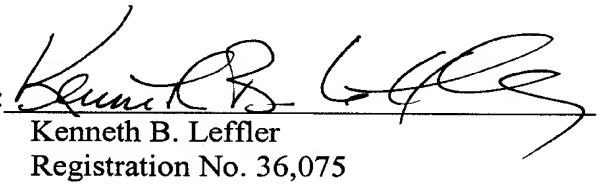
By: 

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